

SHORT CURRICULUM VITAE**ANDRADE PERDRIX, CARMEN**candrade@cimne.upc.edu

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Degree: PhD. in Industrial Chemistry, 1973, Complutense University of Madrid

Present position: **Visiting Prof.** at the International Center for Numerical Methods in Engineering (CIMNE) of Spain.

- I have been **Research professor** of the Spanish National Research Council (Spanish initials, CSIC) at the Eduardo Torroja Institute for Construction Science (Spanish initials, IETcc)
- In 2003 I was awarded an **Honorary Doctorate by the Norwegian University of Science and Technology, Trondheim University**, and in 2006 by the **University of Alicante**.
- In 2021 is Visiting Professor of the “Cadeira: Construindo a Amanha” of the University of San Paulo

- At present I am
- **Honorary President of ALCONPAT International** (Iberoamerican Association of Concrete Repair) (2017-2021) and
- **Vicepresident of the Spanish Association for the Advance of Sciences (AEAC)**.

I am active member of **RILEM, fib, CEN, ASTM, ACI** and **AMPP** (before **NACE**).

I have been:

- **Director** of the Institute of Construction Sciences (IETcc) during 13 years (1985-1988 and 1993-2003).
- **President of RILEM** (2000-2003) (Vicepresident 1997-2000)
- **President of UEATc** (European Union for the Agreement Technique of Construction)(1994-1998)
- **President** of the **WFTAO** (Int. Federation of Technical Agreement Organizations)(2000-2002)
- **President** of **Liaison Committee** (which coordinate to: **CIB, fib, IABSE, IASS, RILEM y ECCE**) (2000-2001)
- **General Director of Technical Policy** in the Ministry of Education and Science of Spain (2006-2008)

Scientific work

My scientific endeavour has focused on the study of **reinforcement corrosion and protection**, concrete durability and the assessment of corrosion-decayed structures. Ever since I defended by PhD. thesis, my contributions had international recognition.

My work was focussed to the basic understanding of the mechanism of the processes involved in corrosion **and their practical application** to lengthen and predict structural concrete service life. Thus, I have worked in all areas related to my specialty (corrosion techniques, carbonation, chlorides and depassivation

features) including protection methods (galvanized reinforcements- by explaining why the alkalis of the cement led to different corrosion rates-, corrosion inhibitors –by studying calcium nitrite, fluorophosphates and organic inhibitors- and or cathodic protection – by patenting a method which does not need to disconnect the bar for evaluating the efficiency). I also studied repair materials as steel-primers, repair mortars and coatings.

All this work was presented in numerous **congresses, courses, conferences** and **technical committees**. I consider important my work in the **RILEM**, where I chaired the Technical Committees that made Recommendations on Electrochemical testing methods for concrete and later, on Chloride diffusion tests and modelling. At present I am much more active in **fib** (International Federation of Concrete) and its Commissions 3-Existing structures and the 8-on Durability where I chair the WG on “Corrosion Propagation modelling”. I am also member of the *fib*-TC on writing the new version of the Model Code.

My educational activity includes the supervision of **33 PhD. theses**, plus two underway, **25 master’s** (or equivalent) and **17 senior’s dissertations**, as well as **31** short-term internships. Since 2011 until 2016 I have fostered yearly “**Advanced Courses**” delivered at the IETcc until 2017, for which I was acknowledged as **Honorary Director**. I have also created the **Doctoral Master SEDUREC** delivered as a specific degree at Menéndez Pelayo University in 2010 and 2011 and after during 2015-2016 as an **ANECA**¹-approved, PhD. credit-carrying UIMP-CSIC MSc.

In the level of **standards** I have been Chairman of the Spanish CEN-mirror group on Durability (UNE committees) for more than 20 years. I chair now the corresponding to repair materials (UNE CT-83/SC7-mirror of TC104/SC8) Also I have been member from the 1990’s of the CEN Committees on durability testing and service life (listed further).

Technology transfer I have concluded **250** agreements with private organisations most recently with Sacyr, partner in **Grupo Unidos por el Canal, GUPC**, which has built the locks for the new Panama Canal. I have been awarded **14 patents and utility models in Spain and one in the USA, five of which** have been built into a **handheld corrosimeter** (GECOR), internationally acknowledged for its accuracy, manufactured under a CSIC-Geocisa partnership. I have also registered **two software applications** to compute service life and brand names for two **sensors** and a **resistivimeter**. I have recently founded a spin-off (ISD: Ingeniería de Seguridad y Durabilidad²) to market these products more effectively.

Publications: I have authored **280** articles in SCI-listed international and **160** in unlisted journals, **150 chapters in books** published in Spain or elsewhere and **30 books** (as author or editor). I have presented **650 communications** in international congresses and **250** in similar Spanish events. I have been keynote speaker or guest of honour in **80** congresses. My **h-index is 59**. I have accumulated the maximum possible (six periods each) salary complements due to productivity of “**6-year and 5-year merits**” evaluated by the Spanish Agency.

I was Principal Investigator head researcher for the **Consolider** project entitled SEDUREC³ conducted in conjunction with the Technical University of Madrid and the International Center for Numerical Methods in Engineering at Barcelona, approved in the first (2006) edition of the 2010 Ingenio Programme. My scientific endeavour has focused on the study of **reinforcement corrosion and protection**, concrete durability and the assessment of corrosion-decayed structures. Ever since I defended by PhD. thesis, my contributions had international recognition evidenced among other, by “Eduardo Torroja Medal-1973” to the work of my Thesis, “Robert L’Hermite Medal-1986” from RILEM and NACE.-“R.N.Whitney Medal-2013”

¹ Spain’s quality assessment and accreditation agency

² safety and durability engineering

³ Seguridad y Durabilidad de Estructuras - structural safety and durability

(its most prestigious one, having been the only given to a researcher working in reinforcement corrosion)

I am member or has been during years of the Editorial boards of several SCI-listed journals, including:

- **Cement and Concrete Composites** *Cement and Concrete Research*;
- **Advances in Cement Research**
- **Cement and Concrete Research**
- European Journal of Environment and Civil Engineering (EJECE);
- Hindawi Publishing Corporation's *Open Electrochemistry Journal*;
- **International Journal of Corrosion**;
- CSIC's *Materiales de Construcción*.

Awards.-I have been awarded a number of prizes, most notably:

- 1973- "Eduardo Torroja" Prize for Technological Research granted for my PhD. thesis by the CSIC's Juan de la Cierva Trust;
- **1986- RILEM's Robert l'Hermite Medal** for young researchers (first woman awardee in 1986);
- Medal of the "Instituto del Cemento Portland Argentino"
- **1996 -Rilem Fellow**
- 1997 International Award of CANMET for the contributions in the research in reinforcement corrosion
- 2000 - **Medal** of the jubilee of Prof. Ricaldoni by the Civil Engineering Dpt, of Montevideo
- **2002 -Manuel Rocha Prize** for research in civil engineering awarded by the Government of Portugal, received personally from erstwhile Prime Minister Dr Durão Barroso;
- 2005 selection of the corrosimeter as one of the 10th most important patents of CSIC- Spain
- 2008 "**Distinguished Member**" of the Institution of Chemistry (Colegio de Químicos) of Spain.
- 2009 "Gallega del mes" by the Journal "El Correo Gallego" and "Galicia Hoxe, Tierra de Santiago, Radio Obradoiro y Correo TV".
- 2013 **Award "Distinguished Carrier" by the Iberoamerican Association ALCONPAT**
- 2013- U.S. National Association of Corrosion Engineers (NACE) **W.R. Whitney Award** (2013, first Spaniard and first woman awardee in its 66-year history);
- 2013 Sacyr Prize for Innovation (2014) for my innovative contribution to concrete durability in Sacyr's design for the Third Set of Locks to Enlarge the Panama Canal;
- 2014 **Honorary Member of the LAT-RILEM** for the contribution to its creation.
- **2015 Golden Master Award** of the Real Fórum de Alta Dirección's⁴
- 2015 Corresponding Member of the **Academy of Engineering** of the Province of Buenos Aires-Argentina
- 2016 "Research Grant Award for Outstanding Researchers", given by "Korea Institute of Structural Maintenance and Inspection" for the research proposal entitled "Reliability analysis of reinforcement corrosion limit state".
- 2017 ACHE-**Medal** from the Spanish Association of Structural Concrete.
- 2017 **Honorary Membership of RILEM** and
- 2018 **Honorary Membership** from the Spanish Association of Concrete Repair (ARPHO).
- 2016 "Research Grant Award for Outstanding Researchers", by the "Korea Institute of Structural Maintenance and Inspection",
- 2017 ACHE Medal /Spanish Association of Structural Concrete) -Spain to the professional achievements,
- 2017 **Honorary Member of RILEM**,
- 2018 Honorary member of the Spanish Association for Repair of Concrete (ARPHO)-Spain
- 2020 **Paul McIntyre** of the Institute of Corrosion of U.K. to recognize "a senior corrosion engineer, who, as well as being a leading practitioner in his field, has advanced European collaboration and international standards development"

⁴ royal senior management forum

- 2021 Member of the Academy of Engineering of Provincia de Buenos Aires -Argentina
- 2021 **fib Fellow** (International Federation of Structural concrete)

I have been member of awards and prizes panels such as:

- 2000 and 2001: **Prince of Asturias Prize for Scientific and Technical Research**;
- 2000 and 2003, Spanish Ministry of Public Works' **Eduardo Torroja Integrated Architecture and Engineering Prize**;
- 2014, **Leonardo Torres Quevedo National Research Prize**;
- 2014 and 2015, **Complutense University of Madrid's Technology Transfer Prize**.

My most prominent Research Management activities include at national level:

- 1980-1982- API (Spanish initials for CSIC research staff association) **Chair**
- 1985-1988 and 1993-2003- **IETcc Director**. My contributions include: 1) 1986- participation in founding and drafting the by-laws for the **Grupo Español del Hormigón**⁵ (GEHO), since 1999 the Asociación Científico-Técnica del Hormigón Estructural⁶ (ACHE); 2) 1996-2003- founding member and Vice-Chair of **AMIET**⁷; 3) 2001- founding member of Red de Institutos de Investigación en Construcción⁸ (REIC); 4) 2000- conclusion of an **agreement with the Spanish Ministry of Public Works** to develop an emergency housing prototype; 5) 2002- conclusion with the same ministry whereby the Institute would draft the preliminary versions of the country's new **technical building code**.
- 2002-2005- **international coordinator** to the Fifteenth **CYTED**⁹ sub-programme
- 2006- Deputy Manager for CYTED's promotion of industrial development division
- 2006-2008- **Director General for Technology Policy**, Spanish Ministry for the Economy and Trade
- 2008-2009- **Adviser** to the Secretary of State for Universities, Ministry of Science and Innovation
- 2009-2012- **Adviser** to the Secretary General for Universities, Ministry of Education
- 2011-2014-Member of **CNEAI's**¹⁰ **'O' committee on technology**

Internationally, my most prominent Research Management activities include:

- 1986-1988- **Head of Spain's delegation to the CEB** as **Chair** of the Grupo Español del Hormigón;
- 1987-1991- **Chair** of RILEM's Technical Advisory Committee (TAC);
- 1986-1988 and 1993-2003- member of UEATc's¹¹ Directors' Committee;
- 1991-1997- **Vice-chair** of COST 509 (Corrosion and Protection of Metals in Contact with Concrete);
- 1994-198- **UEATc President**;
- 1994-1998- **Chair** of RILEM's Coordinating Committee;
- 1998-2000- RILEM **Vice-President**;
- 2000-2001- **Chair of Liaison Committee** (coordinating **CIB, fib, IABSE, IASS, RILEM** and **ECCE**);
- 2000-2003- **RILEM President**;
- 2001-2002- **WFTAO**¹² **President**.
- 2015-2017 Director of Standardization of Alconpat
- 2017-2021 **President of Alconpat International**¹³

⁵ Spanish concrete group

⁶ scientific and technical association for structural concrete

⁷ association of Eduardo Torroja Institute members

⁸ network of construction research institutes

⁹ Programa Iberoamericano de Ciencia y Tecnología para el Desarrollo - Ibero-American science and technology programme for development

¹⁰ Comisión Nacional Evaluadora de la Actividad Investigadora - national commission for research assessment

¹¹ European Union for Technical Approval in Construction

¹² World Federation of Technical Approvals Organisations

¹³ Asociación Latinoamericana de Control de Calidad, Patología y Recuperación de la Construcción

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Participation in International Committees		
Organization	Participation	Committees
RILEM	<i>Member</i>	<ul style="list-style-type: none"> - TC-60-CSC - "Corrosion of steel in concrete" - TC-116 - "Performance Criteria for Concrete Durability". - TC-124 - "Strategies for repair of Corrosion Damages at Reinforcement of Concrete Structures". - TC 226-CNM: Reinforced concrete in the context of nuclear waste management - TC-NUM-Numerical modelling of cement-based materials - TC-238-SCM-Hydration and microstructure of concrete with supplementary cementitious materials - TC- TCM Test methods to determine durability of concrete under combined environmental actions and mechanical load. - TC-CCH Stress Corrosion Cracking and Hydrogen Embrittlement of Concrete-Reinforcing Steels. Cluster D. - Rilem 251-SRT : Sulfate resistance testing - Rilem 270-CIM : Benchmarking Chloride Ingress Models on Real-life Case Studies: Theory and Practice - Rilem 281- CCC : Carbonation of concrete with supplementary cementitious materials - Rilem TC 286-GDP: Test Methods for Gas Diffusion in Porous Media - Rilem TC-DCM: Long-term durability of structural concretes in marine exposure conditions - Rilem TC_ECS: Assessment of electrochemical methods to study corrosion of steel in concrete
	<i>Chairman</i>	<ul style="list-style-type: none"> - TC-154 - EMC "Electrochemical Techniques for measuring metallic Corrosion in concrete". - TC-178 TMC -" Testing and Modelling chloride penetration in concrete" - TC-213-MAI "Model Assisted integral Service Life Prediction of concrete structures"
CEB-fib	<i>Member</i>	<ul style="list-style-type: none"> - 1989-1991 - Task Group "Steel Coatings" de la Commission 7 - 2007 - actual - Commission 5 (now Commission 8) – Service life design. - TG 8.3 (now WG 8.9.2 Corrosion propagation: Operational guidance of probabilistic design) - TG 8.9. Deterioration Mechanisms - Commission 3 Existing structures - Commission 8 Durability - TG 10.1 Model Code 2020 - WG 2.5 Bond steel/concrete - WG 3.2 Bearing capacity of concrete structures with corroded reinforcement - WG 3.3 Existing Concrete Structures: Life Management, Testing and Structural Health Monitoring - WG 3.4 Repair
	<i>Chairman</i> <i>Co-chair</i> <i>Member</i>	
CEN	<i>Member</i>	<ul style="list-style-type: none"> - 1990-1993 - Committees TC104/WG1/TG1 Durability of Concrete - 1990-2003 Committee TC104/WG8 repairs

		<ul style="list-style-type: none"> - 1990-2005 TC 104/WG3/TG-3 Test Methods for the use of admixtures in concrete - 1999-present TC 51 / WG 12 Special performance criteria - 2000-present TC 51 / WG 12 / TG-5 testing methods for corrosion - 2001-present Expert Committee TC 104 / SC-1 / TG-1 - 2008-Present-TC 104 / SC1 - TG 17 Equivalent Durability Performance - 2015-Present-TC 104/SC 1 /WG1 Exposure Resistance Classes - 2012 -present CEN-2250/SC2/TG10- Durability - 2008- 2018 - CEN TC 51 /WG 12 and its Task Groups 1 (Sulphate testing) - 2010- present TC 219 Cathodic protection - 2012-present - CEN TC 250/SC2/ TG3 Evaluation of existing Structures - 2012-present- CEN TC104/SC8 Repair and Protection of concrete
JCSS	<i>Member</i>	- 2001- present Plenary and Task Group 2 of the Joint Committee of Structural Safety
EUROPEAN UNION	<i>Referee Coordinator</i>	- 1989 Projects BRITE
	<i>Member</i>	- 1999-2001- Cluster 13 of the Targeted Research Action: Environmentally Friendly Construction Technologies (TRA-EFCT)
	<i>Member</i>	- 1999-2000 - Panel de evaluation "Five Year evaluation Panel of the Framework Program" EU, by invitation de la DG- Growth Panel EV/991/0227 Science Technique and Development
COST	<i>Vicechairman</i>	- 2000-2001 - Expert Advisory Group-I (EAG) del Program "Growth"
	<i>Chairman</i>	- 2004-2010 European Construction Platform
	<i>Member</i>	
CYTED	<i>Vicechairman</i>	- 1991- 1996 COST-509 - "Corrosion and Protection of Metals in Contact with Concrete"
	<i>Chairman</i>	- 1998-2001 "Monitoring group" de la ACCION COST 521 – Corrosion of steel in reinforced concrete structures"
	<i>Member</i>	- 2003-2007 COST 534 - New materials and systems for prestressing structures
CYTED	<i>Member</i>	- 1992-1999 - Network DURAR
		- 1999-2003 - Network REHABILITAR
		- 2000-2005 - Network DURACON
Network NANOCEM		- 2008-2015 - Network PREVENIR
	<i>Member</i>	- 2006-2010 Member of Steering Committee and Scientific Committee
ICIC	<i>Secretary</i>	- 2015-2016 - International Committee of Irradiated Concrete
	<i>Member</i>	- 2016-2017
NACE		- 1991-2000 - Member of Research Committee
EUROPEAN FEDERATION OF CORROSION	<i>Member</i>	- 1993 -2002 and 2018-present - Working Party on Concrete
		- 2014- Working Party on WP 8: Physico-chemical Methods of Corrosion Testing.

Participation in National Committees

Organization	Participation	Committees
AENOR (now UNE)	<i>Member</i>	- 1986- Actual- - CT 80-Plenary Cement
	<i>Member</i>	- 1986-Actual- CT-83. Plenary- Concrete
		- 1987-1988 - Commission for Certification

	<i>Vicepresident- President and Member and Chairman</i>	<ul style="list-style-type: none"> - 2000-Actual- CT 140 – SC2. Eurocode Reinforced Concrete - 2000-present- CT-83/ SC10 - Durability (Vicepresident until 2005, until 2017 President and now Member) - 2006- Subcommittee CT-83/SC10: “Durability of concrete - 1990 -Actual Subcommittee CT-83/SC7: “Repair Materials”
CIETAN y CIETSID	<i>President President</i>	<ul style="list-style-type: none"> - 1986-1988 - Certification Mark CIETSID as Director IETcc. - 1993- 2003- Certification Mark CIETAN as Director IETcc
Comisión Permanente del Hormigón	<i>Member Coordinator</i>	<ul style="list-style-type: none"> - 1994-2005- Permanent Commission of Reinforced Concrete (CPH) - 1995-2005- Permanent Commission of Cement (CPC) - 2003-2005 Working Group of CPH “Evaluation of existing structures”, “Lightweight concretes” and “Selfcompacting Concretes”
GEHO/ACHE	<i>Member</i>	<ul style="list-style-type: none"> - 1986-1988 – Commission on “In-srvice Performance” and on “Durability” - 1987-1988 -Commssion “Materials” and “Repair works” - 1988-Actual- Subcommittee on Admisxtures
Other Associations	<i>Member Vicepresident Coordinator President President Founder and Vicepresident Honorary Member Founder and President Member “ “</i>	<ul style="list-style-type: none"> - 1983-Actual- Grupo Especializado de Electroquímica de la RSEFQ - 1986-1988- Asociación Madrileña de Corrosión y Protección - 1986-1988 - Subprograma Temático del CSIC “Corrosión de Armaduras” - 1988-1994 - Comisión de Construcción de RELE - 1994-actual - Comisión de Laboratorios de Construcción de ENAC - 1996-2003 - Asociación de Miembros del IET (AMIET) and 2004- Actual Asociación de Miembros del IET (AMIET) - 2004 Spanish Plataform of Construction - 2000-2003 - Fundadora y Presidente de la Red Española de Institutos de Construcción (REIC) - 2011-present – ARPHO Asociación sobre Reparación, refuerzo y Protección del hormigón - 2011-present -ATC- Technical Assoc. of Roads.- Grupo de trabajo sobre Reparación de Puentes de la Asociación Técnica de la Carretera

Main representations as General Director of Technical Policy (2006- May 2008) of Ministry of Education and Science

- Rector Councils
 - o High Research Council CSIC.
 - o National Center of Energy, Environment and Tecnology, CIEMAT
 - o Center for Tecnological Development (CDTI).
 - o National Agency for radioactive waste management ENRESA
 - o Proposal of Construction of the European ESS in Bilbao for the Neutron Expalation Source.
 - o Supercomputing Center of Barcelona
 - o Laboratory of Neutrines of Canfranc y President of its Executive Committee
 - o Consejo Rector del Organismo Autónomo Canal de Experiencias Hidrodinámicas del El Pardo
- Councils
 - o Foundation “Scientific Park of Barcelona”
 - o Spanish Foundation for “Science and Technology” (FECYT).
 - o Foundation for “Tecnological Development of Renewable Energies” (CENER).
 - o Consortium for “Ultraintense and Ultrashort Pulsed lasers”(CLPU).
 - o Spanish Institute of Oceanography
 - o Executive Committee for the Construction, Equipment and Exploitation of the ‘Laboratorio de Luz Sincrotrón.

- Foundation “Technical Institute for Car Security” (FITSA).
- Foundation Technical Institute for Development of Marine Industries” (INNOVAMAR).
- Foundation INASMET-Tecnalia.

- Member of:

- Plenary of the Council for Sustainability, Innovation and Quality in the Construction of the Ministry of Public Works
- Science in Strategic Forum for European Research Infrastructures” (ESFRI).